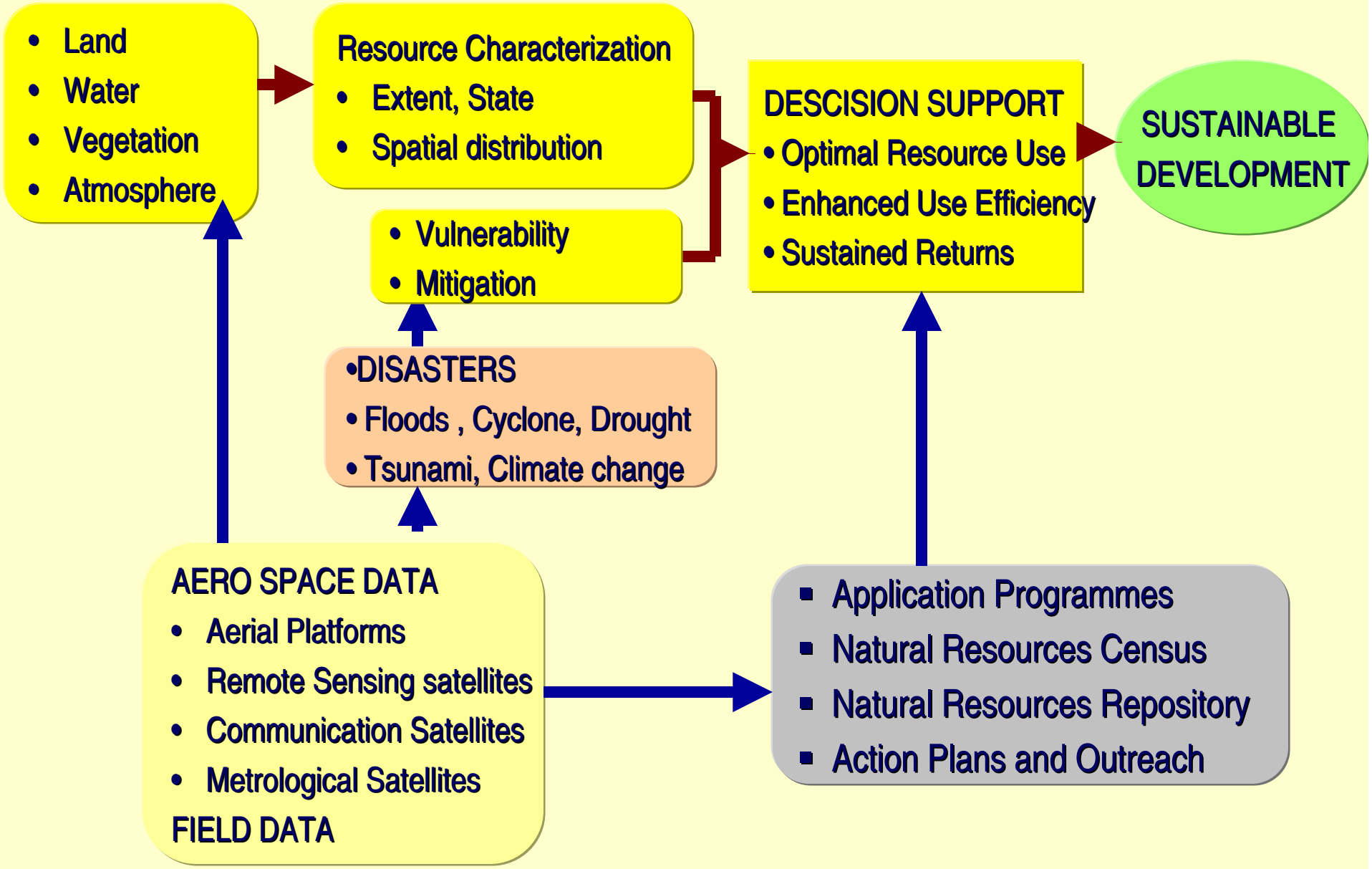
50th UN COPUOS Agenda Item 12

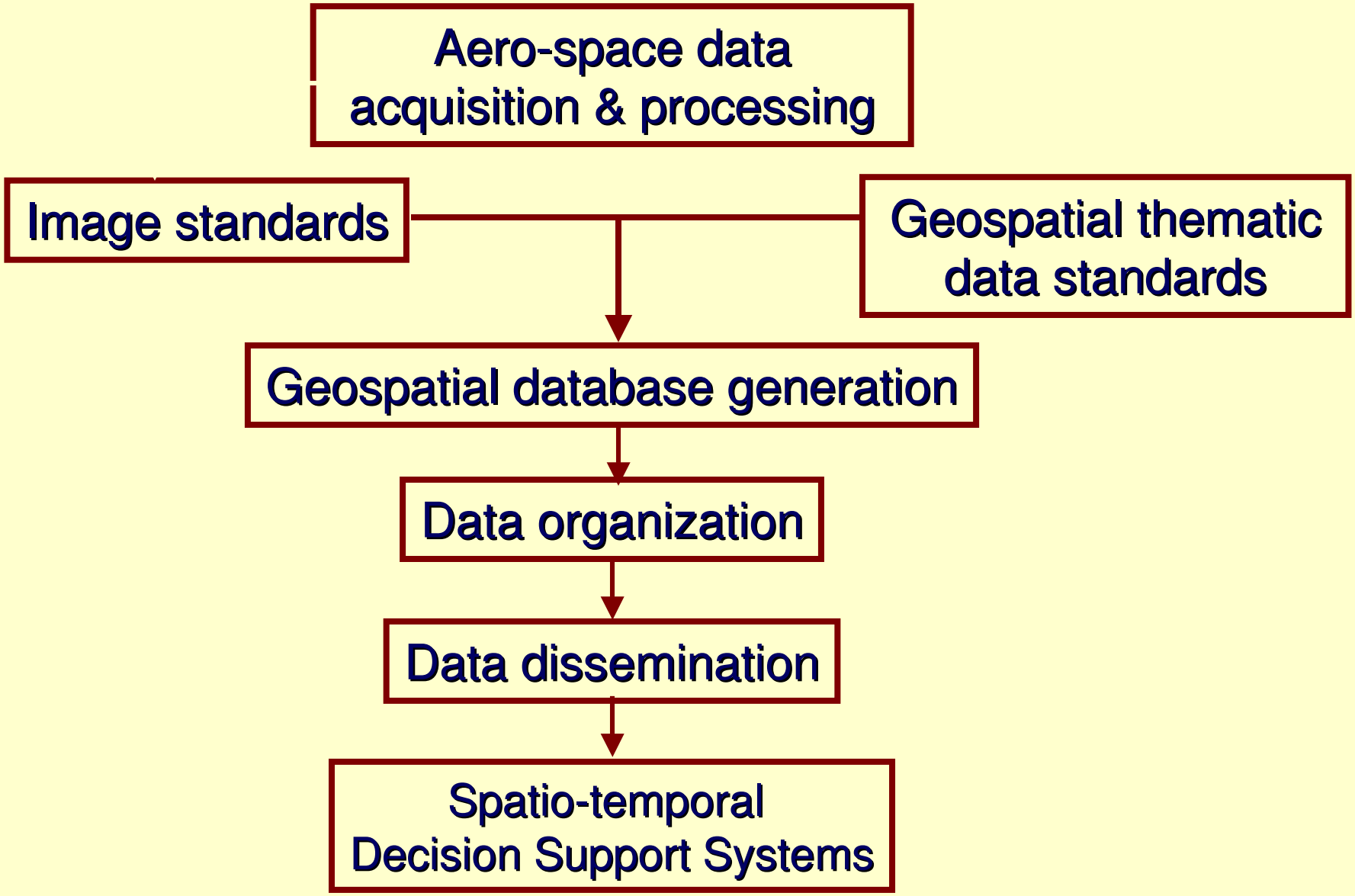
Space-derived Geospatial Data fro Sustainable Development

Presentation by Indian Delegation

SPACE INPUTS FOR SUSTAINABLE DEVELOPMENT



CREATION OF GEOSPATIAL DATA
-THE PROCESS IN PLACE-



Major Sources of Data

Institution	Resource
Survey of India (SOI)	Topographical maps, geodetic trig. And levelling data, gravity & geomagnetic data, GPS data, tidal data, repetitive geodetic & geophysical data
Geological Survey of India (GSI)	Geological maps on various scales, geological and seismic data
National Remote Sensing Agency (NRSA)	Satellite imageries, land use and waste land maps on small scales
Forest Survey of India (FSI)	Forest maps and data of Indian forests
Central Ground Water Board (CGWB)	Hydrology maps
National Bureau of Soil Survey and Land Use Planning (NBSS&LUP)	Soil maps and land use data
Central Water Commission (CWC)	Command area maps

Major Sources of Data

Institution	Resource
National Atlas and Thematic Mapping Organisation (NATMO)	Thematic data in the form of maps and atlases
Ministry of Environment & Forests (MoEF)	Coastal land use maps
Indian Meteorological Department (IMD)	Meteorological and seismic data
National Hydrographic Department (NHD)	Naval charts
Ministry of Ocean Development (MOD)	Oceanic data
Ministry of Surface Transport (MST)	Surface transport information
Data from State Governments	Census, local administrative network, cadastral information

NNRMS Standard 2005

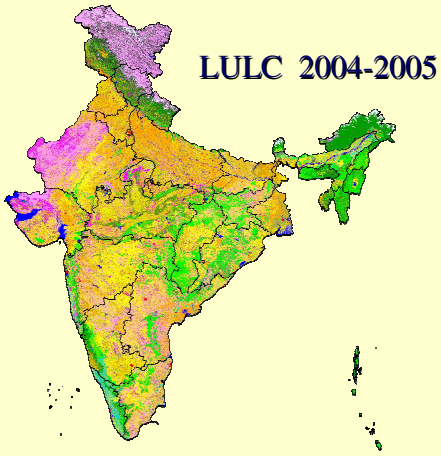
- A National Spatial Framework Standard – Up to 1:10k
  - Image standard (As per Mapping Needs)
  - Mapping standard (National Standard)
  - GIS database standard (Projection-free)
  - User delivery standard (Multiple Formats)

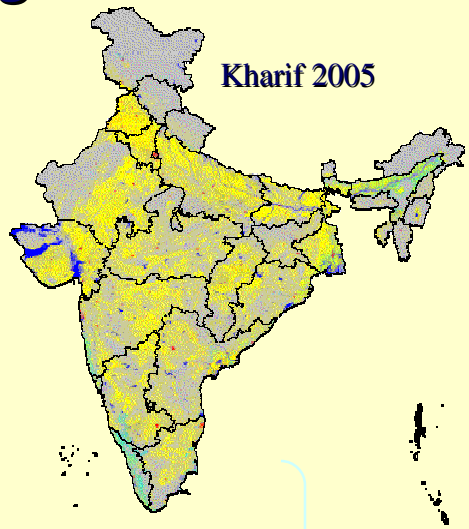
- NRR Content Standards
  - What layers and their attribute schemas
- NRR Process Standard
  - Generation, porting of spatial data into NRR
- GIS Database Design Standards
  - Parameters of GIS design for the repository

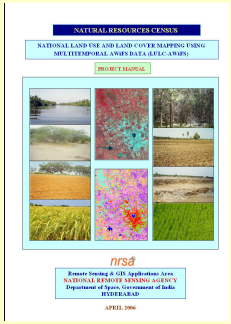
- "Seamless" Cadastral Referencing
  - Methods and accuracies

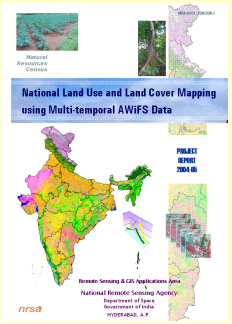
- Accuracy And QA Standards
  - Map accuracy
  - GIS database accuracies
  - Outputs accuracies

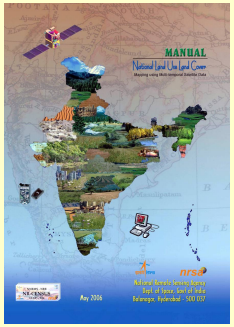
Natural Resource Census

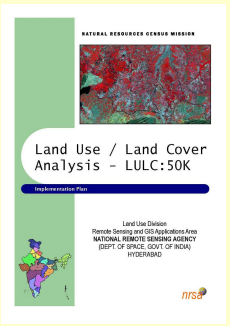












1. Land use/Land cover Mapping
   - AWiFS (1:250k)
     - first cycle is completed
     - second cycle is in progress
   - LISS-III (1:50k)
     - preparations for first cycle

   ISRO/DOS

2. Soil Mapping :

   Ministry of. Agriculture

3. Land Degradation Mapping
4. Geomorphological Mapping …

   GSI

5. Vegetation Cover Mapping

   FSI

6. Wetland (& Surface water body) Mapping

   MoEnF

7. Snow and Glaciers Mapping

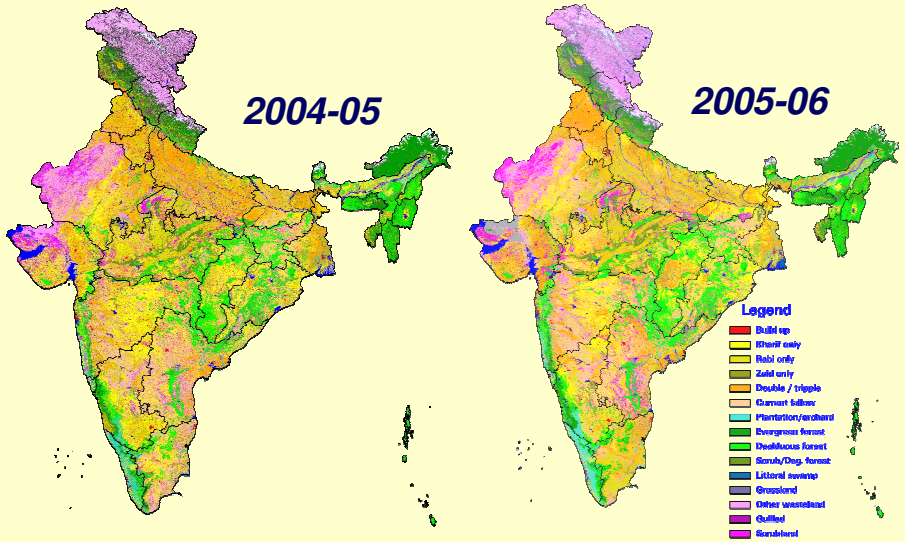
Natural Resources Census
Land Use/Land Cover

Geospatial information on

Land Use / Land Cover

at 1:250,000 and 1:50,000

- Net sown area for different cropping seasons – *kharif, rabi, zaid*
- Integrated LULC map of the year



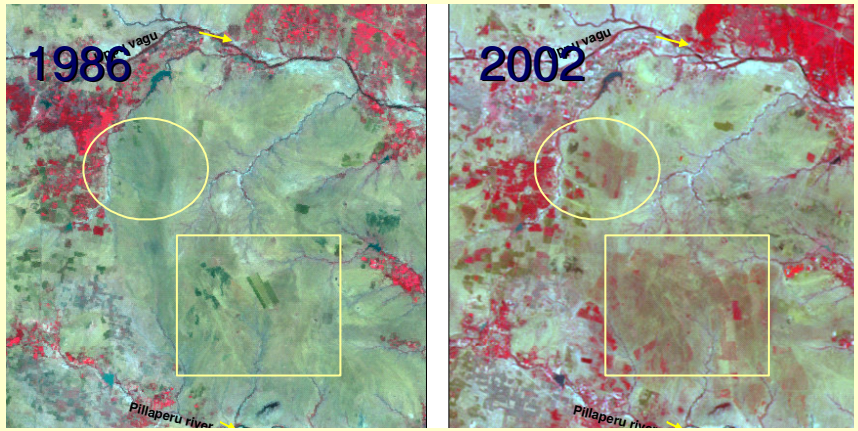
- Spatial patterns of land cover and land utilization
- Inter-annual trends
- Resource utilization plans
- Carrying capacity models

National Wastelands Mapping / Monitoring

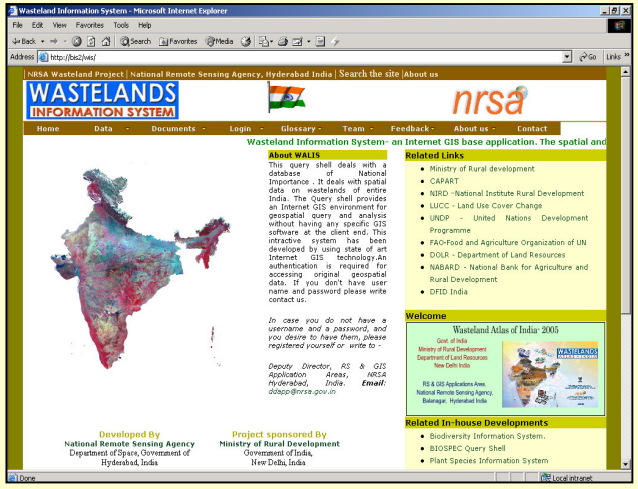
Geospatial information on

- Wasteland maps at 1:50000 scale
- 28 Categories of wasteland
- Boundaries up to Micro watershed (500ha)
- Wasteland Atlas

Wasteland Dynamics



Web-based
Wasteland Information System



- Seamless digital database from national to village level
- Spatial and temporal patterns

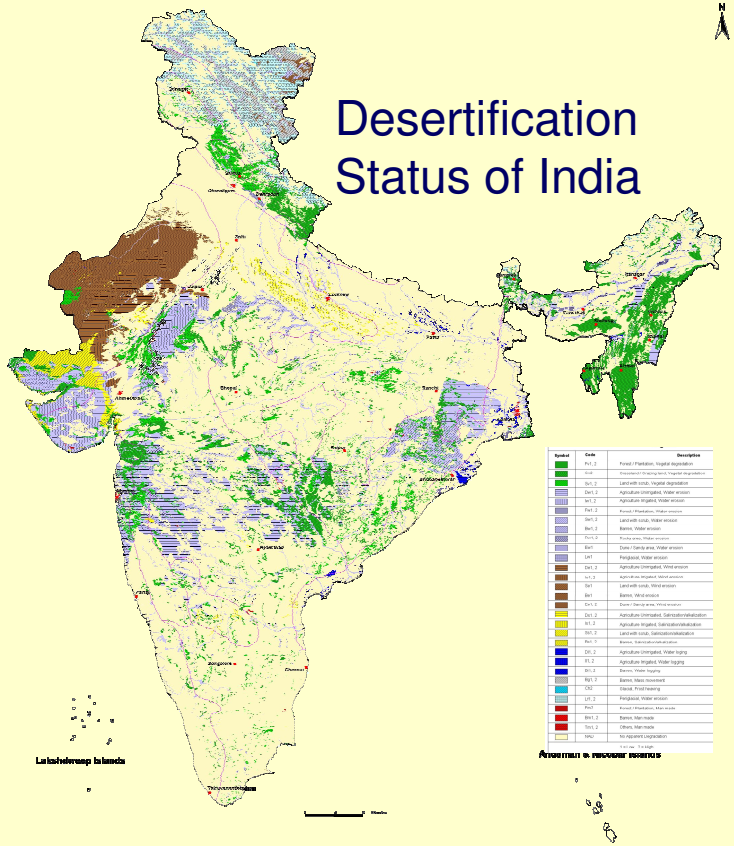
- Wasteland Development
- Mitigating Eco-degradation
- Rural Employment/Assets
- Poverty alleviation

Land Degradation

Geospatial information on

Water Logging
Soil Salinity
Soil erosion
Degradation of Vegetal cover

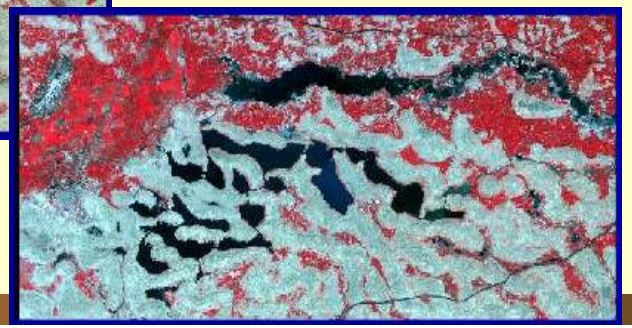
- Desertification
- Resource base information
- Locale specific problem identification (e.g., salinity, water logging, etc.)
- Execution & Developmental plans



Desertification Status of India

1975

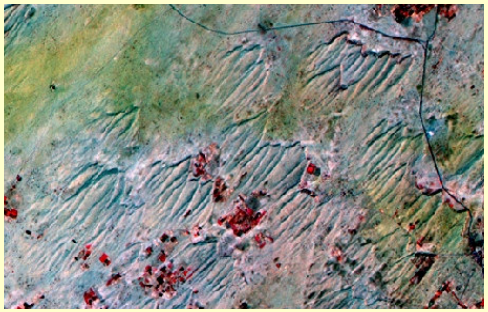
1999



Water Logging along IGNP Canal

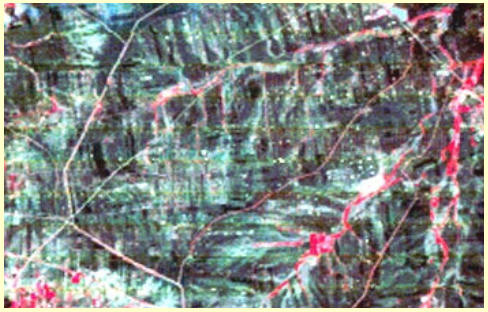
- Identification of degraded lands
- Reclamation measures
- Optimum land use planning
- Monitoring & management

Land degradation

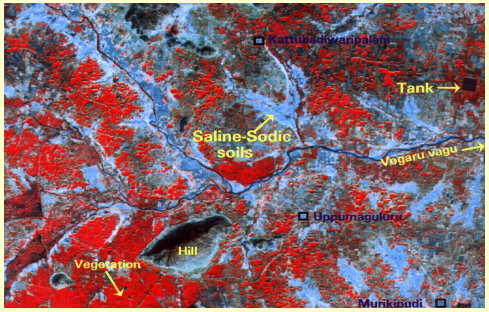


Wind erosion

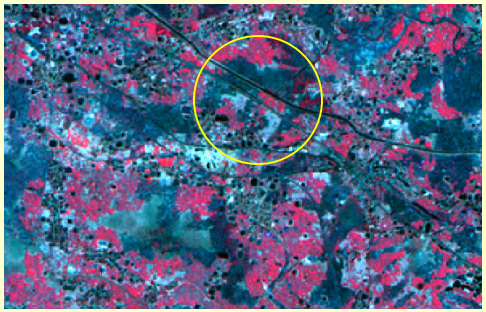
Water erosion - ravines



Water erosion - rills



Salt affected soils



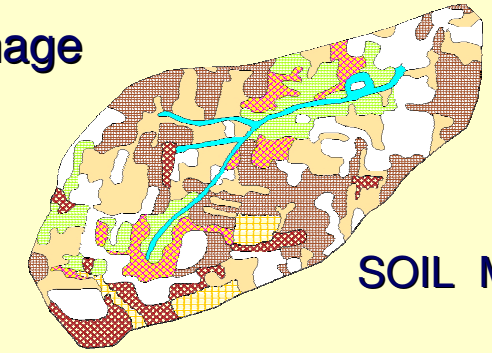
Water logging

Satellite data
Physiography / Landform
Ancillary data
Soil sample collection
Soil analysis

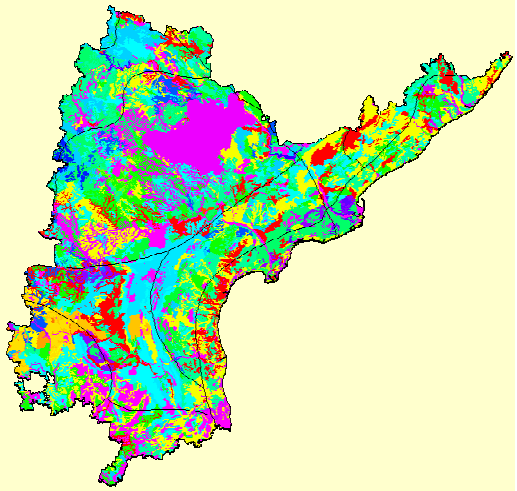
Assess degradation status
Reclamation measures
Optimum land use planning
Monitoring & management

Soil Mapping

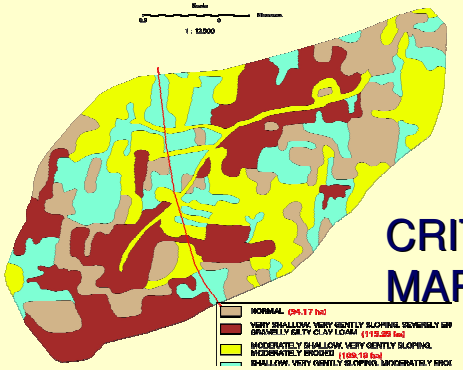
Spatial variability of soils
Soil depth / texture / slope / drainage
Soil reaction / erosion / etc



SOIL MAP



SATELLITE DATA



CRITICAL AREAS MAP

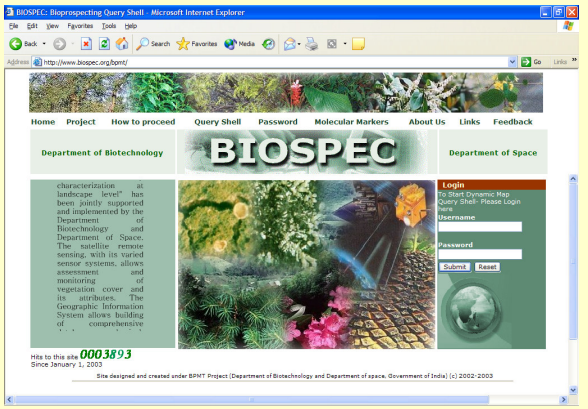
Satellite data
Physiography / Landform
Climatic data
Soil profile studies
Soil sample collection & analysis

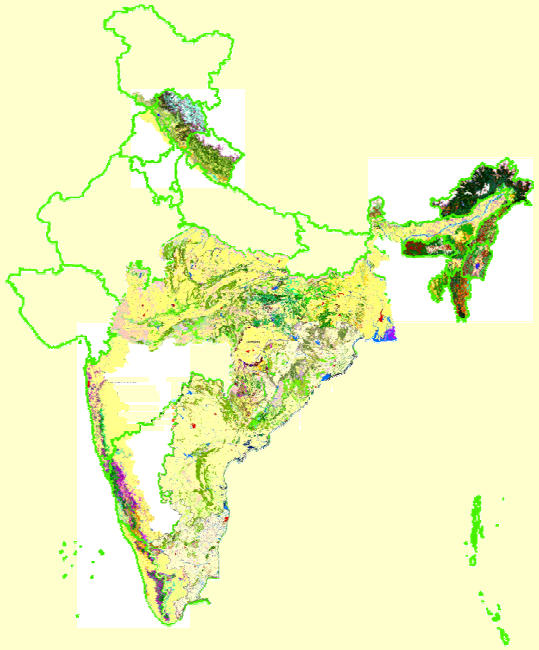
Soil productivity / fertility
Optimum land use planning
Assess degradation status
Derivative Information –
- Land capability / irrigability
- Watershed characterisation & prioritisation
- Suitability analysis

National Landscape level characterization of biodiversity

Geospatial information on

- Forest vegetation/land cover
- landscape characterization
- Biological richness
- Disturbance regimes





- Comprehensive, digital forest type database
- Major phenological classes
- Degraded stages
- Unique ecosystems & locale-specific classes

Web-enabled biodiversity Information System

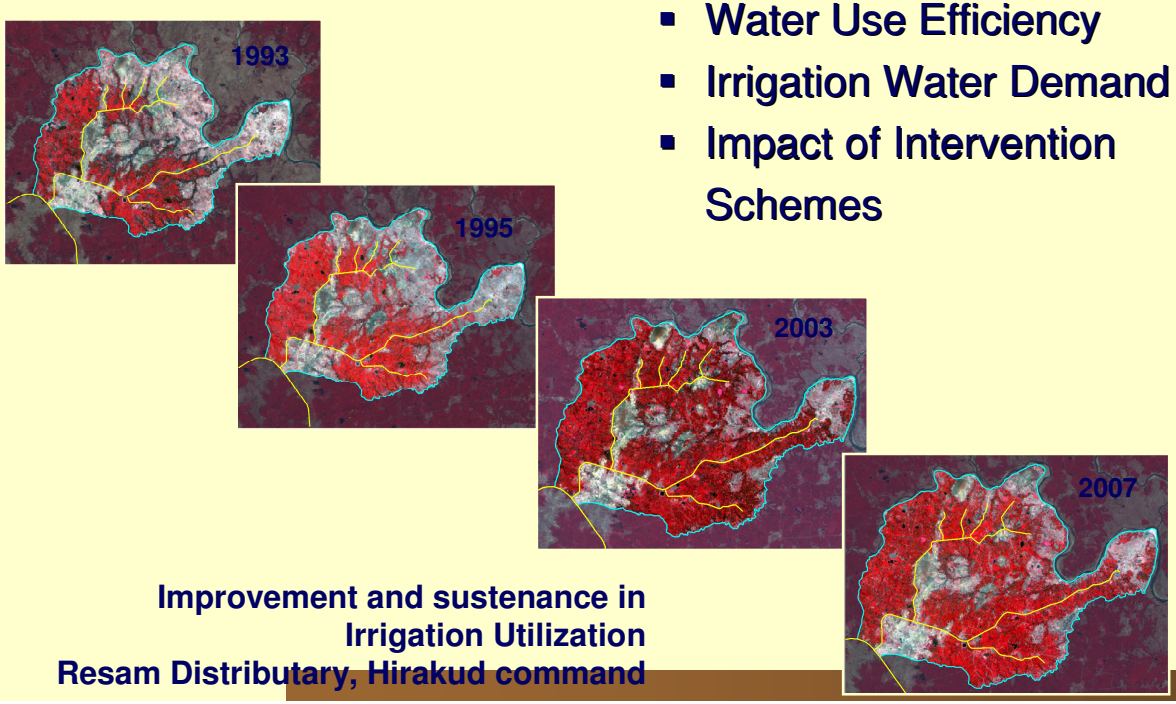
- Forest Management
- Bio-prospecting
- Biodiversity conservation & prioritization

Irrigated Command Area Monitoring

Geospatial information on

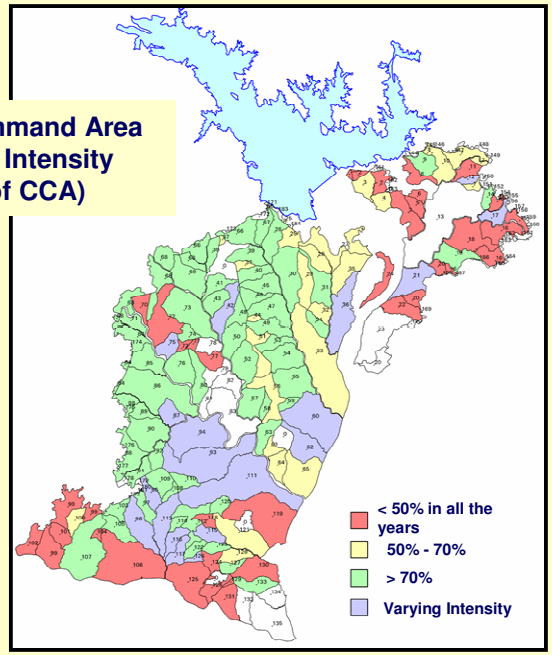
- Cropping Pattern
- Crop Condition / Productivity
- Irrigation Progress
- Irrigation Infrastructue

- Irrigation Utilization
- Spatial and Temporal variations in performance
- Water Use Efficiency
- Irrigation Water Demand
- Impact of Intervention Schemes



Improvement and sustenance in Irrigation Utilization
Resam Distributary, Hirakud command

Hirakud Command Area
Rabi Crop Intensity
(% out of CCA)



- Improved Irrigation Water Management
- Irrigation Scheduling
- Improved Water Use efficiency
- Performance Optimization & Sustenance
- Decision Support System

National Database for Emergency Management

- Establishing stand-alone GIS based database for handling unexpected situations during disasters (natural or technological)

- Reduce the possible consequences of the emergency by
  - Preventing fatalities and injuries
  - Reducing damage to buildings, stock, and equipment; and
  - Accelerating the resumption of normal operations

- Organize multi-level geospatial data to facilitate emergency management
  - Database generation / organization – core and hazard specific database (1:50000 for the entire country, 1:10000 for part of 169 multi-hazard prone districts in 17 states, 1:2000 for 5 mega cities)

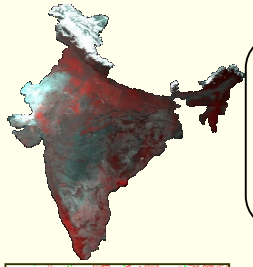
- Development of decision support tools for addressing emergency management and integrate with national disaster frame work

- Institutional mechanism for sharing and updating database on continuous basis

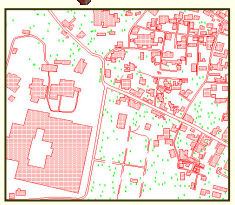
NNRMS: NR Repository

Create and maintain a systematic archive of all the digital spatial data of thematic and base maps generated using remote sensing data

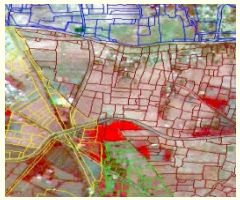
NRR Data Generation



NRC
(1:250K / 50K;
7-8 Layers;
Every 5 years)



LSM
(1:10,000;
New Basemap)



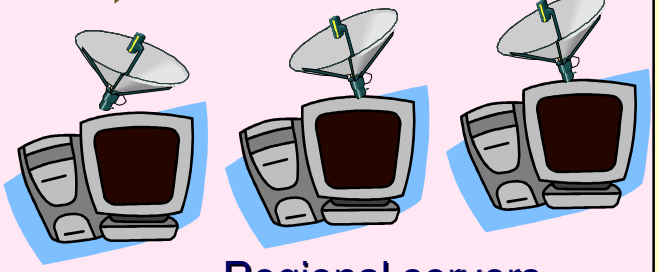
Cadastral LIS
(1:4,000+;
Referenced;
"Spot" Database)

Other Projects
(All Scale;
when available;
User defined)

NR Database

Master
Server

SPACENET



Regional servers

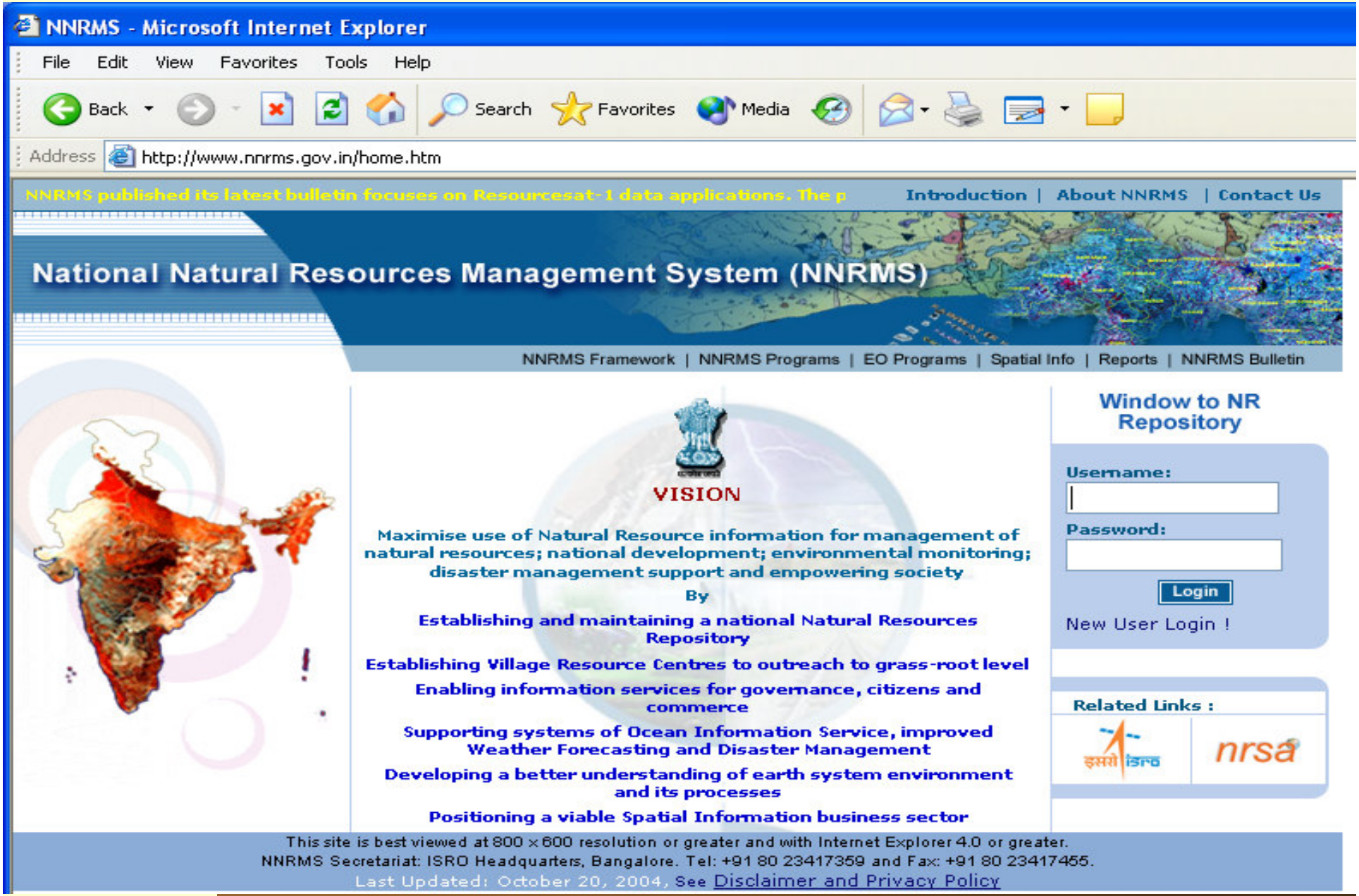
NR Services

NNRMS Portal

INTERNET

User client

NNRMS Portal



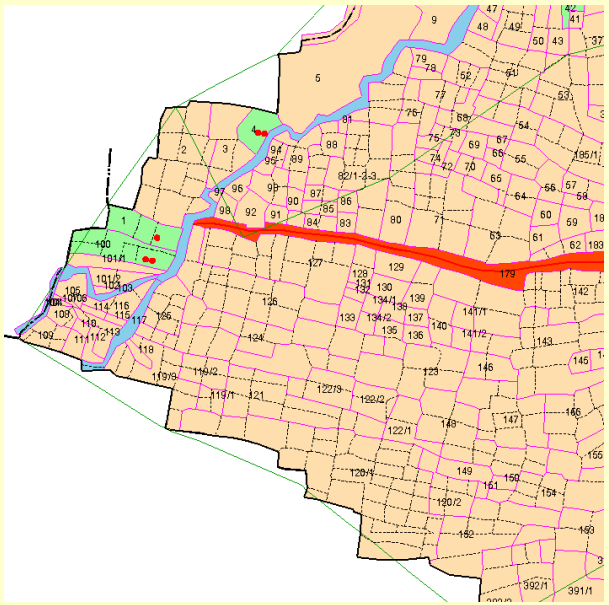
Cadastral Referenced Database

Geospatial information on

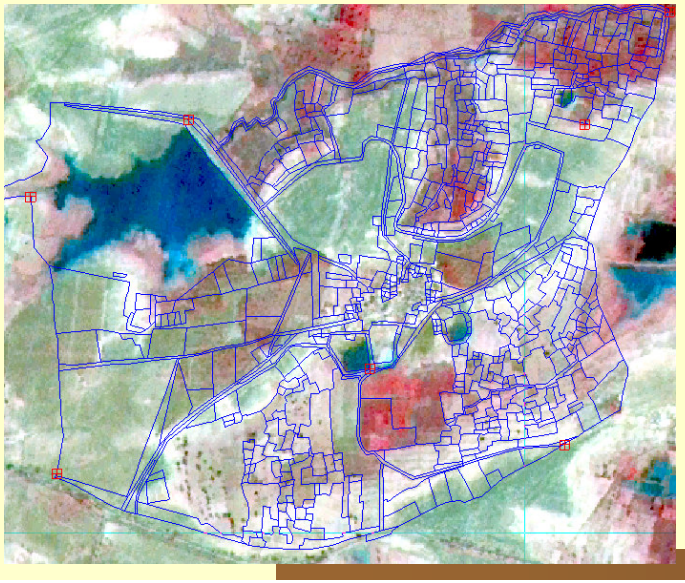
Cadastral parcels
Land Utilization Patterns
Water Resources
DEM, DSS, …

- Digital Land Records
- Resource base information
- Locale specific problem identification (e.g., salinity, water logging, etc.)
- Execution & Developmental plans

GIS COVERAGE

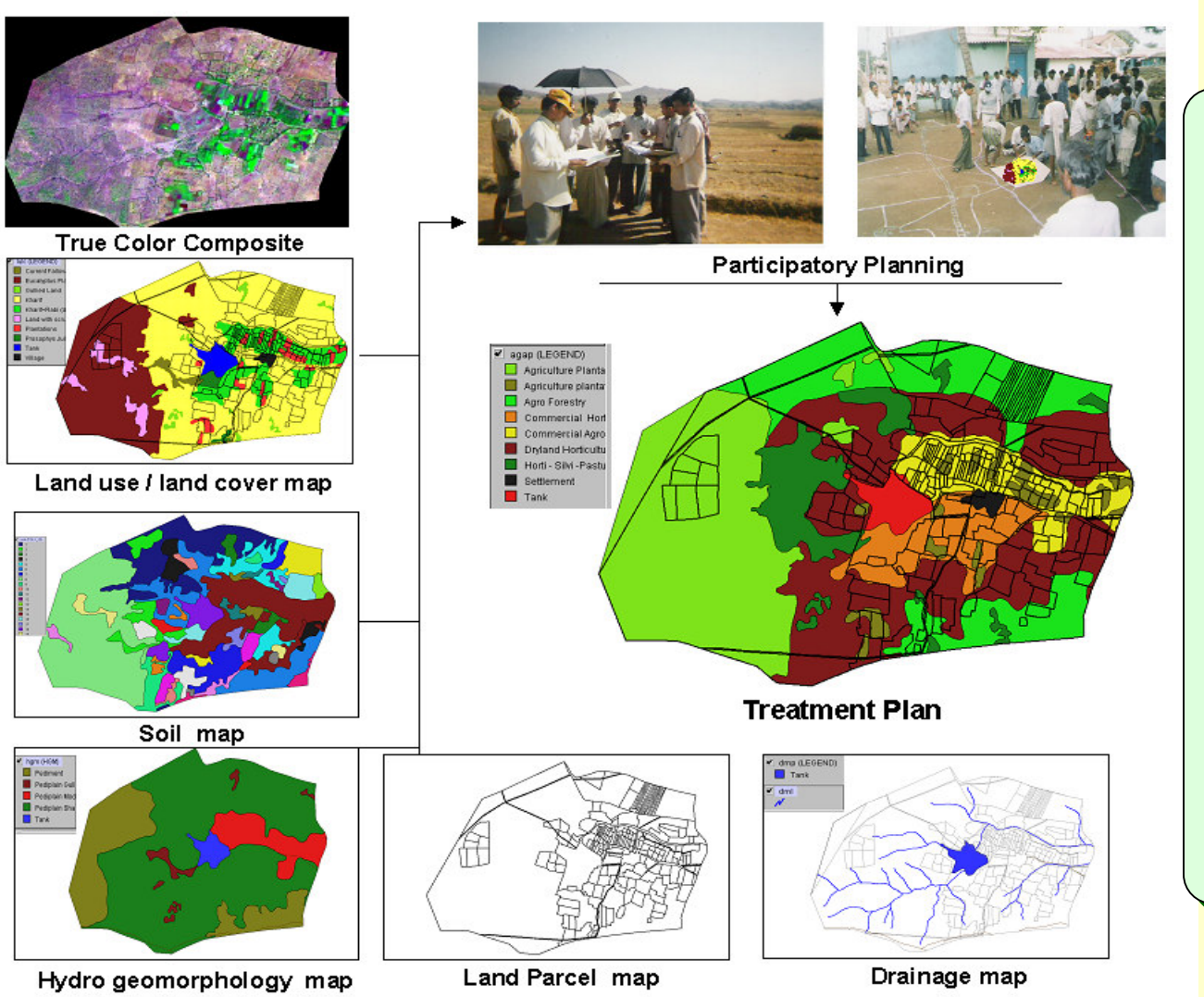


Satellite data overlaid with caadstral boundaries



- Soil amelioration measures
- Prioritization of farm/village ponds for de-siltation
- Identification of degraded lands
- People's participation

EO for Planning with Community

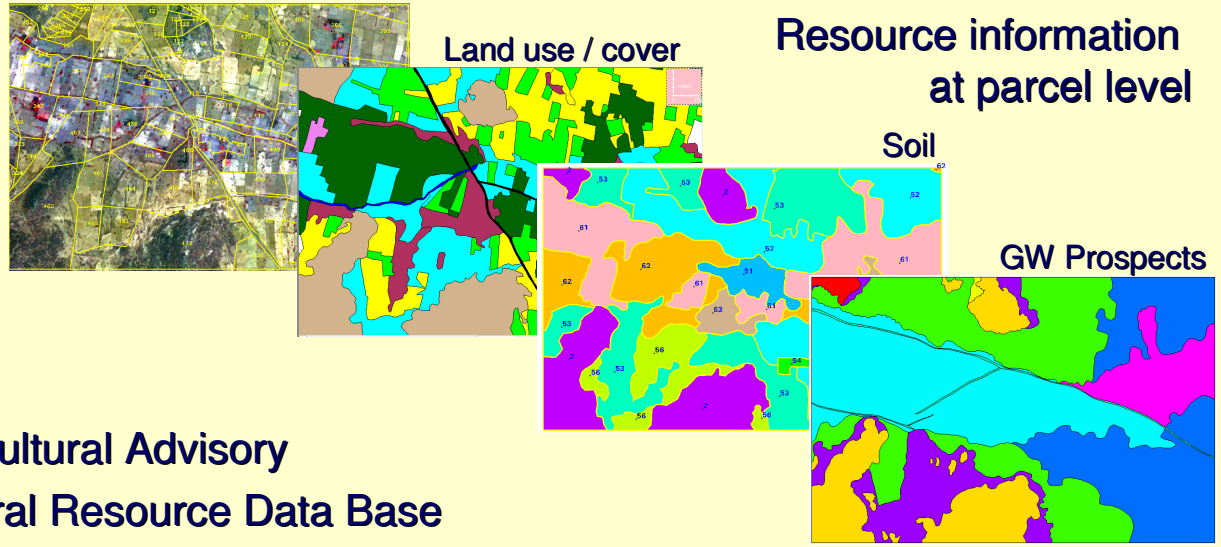


- Action plan by integrating resource maps, people aspiration & socio economic inputs
- On microwatershed basis
- For Land and water resource development
- Soil & water conservation

Village Resource Centre

Geospatial information on

- Land Utilization
  - Crop – Kharif, Rabi, Zaid
  - Fallow
  - Vegetation
  - Settlement
  - Commercial
- Land Quality & Capability
  - Physiography
  - Erosion
  - Slope
  - Micro Nutrients
- Water Resources
  - Surface
  - Sub-surface
  - Quality
- DEM, DSS, …



Resource information at parcel level

- Agricultural Advisory
- Natural Resource Data Base
- Tele-Education
- Tele-medicine/ Healthcare
- Alternate Livelihood
- Weather
- Disaster Management Support
- Commodity Market
- Legal Advise

- Resource Management
- Community Participation
- Connectivity
- Multipurpose Services
- Partnership
- Capacity Building
- Sustainability

In conclusion

- India has demonstrated the capabilities up to generation and utilization of space-derived geo-spatial information for sustainable development.
- There is a national effort to create a single window system for geospatial data
- Efforts are in progress to use geospatial data for several newer applications applying advanced technologies.
- Dedicated missions for specific and critical thematic information are also being planned for societal benefits.

Thank you
for your kind attention